

Validation of the European SCORE2 algorithm in four European and non-European cohort studies with contrasting populations

K.K. Maung¹, E.I.R.I.N.I. Trichia², G.A.R.Y. Tse³, J.I.A.N.D.O. Zhou⁴, B.E.R.N.A.R. Man Yun Cheung⁵, Y.O.S.H.I.H. Kokubo⁶, H.E.N.R.I.Q. Barros⁷, T.O.S.H.I.K. Kaihara⁶, V.L.A.D.A. Hanchar⁸, J.E.S.U.S. Alegre-Diaz⁹, P.A.B.L.O. Kuri-Morales¹⁰, R.O.B.E.R.T. Tapia-Conyer⁷, A.H.M.E.D. Arafa⁶, L.O.U.I.S.A. Gnatiuc Friedrichs²

¹University Hospital Centre Vaudois (CHUV), Lausanne, Switzerland

²University of Oxford, Clinical Trial Service Unit and Epidemiological Studies Unit, Nuffield Department, Oxford, United Kingdom of Great Britain & Northern Ireland

³Hong Kong Metropolitan University, School of Nursing and Health Sciences, Hong Kong, China

⁴The University of Hong Kong, Department of Family Medicine and Primary Care, Li Ka Shing Faculty of Medicine, Hong Kong, Hong Kong

⁵The University of Hong Kong, Division of Clinical Pharmacology, Department of Medicine, School of Clinical Medicine, Li Ka Shing, Hong Kong, Hong Kong

⁶St. Marianna University School of Medicine, Department of Cardiology, Kawasaki, Japan

⁷Faculty of Medicine University of Porto, Departamento de Ciências da Saúde Pública e Forenses e Educação Médica, Porto, Portugal

⁸Instituto de Saúde Pública da Universidade do Porto (ISPUP), EPIUnit, Porto, Portugal

⁹National Autonomous University of Mexico, Experimental Research Unit from the Faculty of Medicine, Mexico City, Mexico

¹⁰Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Mexico

Funding Acknowledgements: Type of funding sources: Foundation. Main funding source(s): Ko Ko Maung is supported by the Swiss National Science Foundation.

Background: SCORE2 estimates 10-year risk of developing fatal and non-fatal cardiovascular disease (CVDs) in Europe, however, whether it can be directly applied in non-European countries has not been extensively studied.

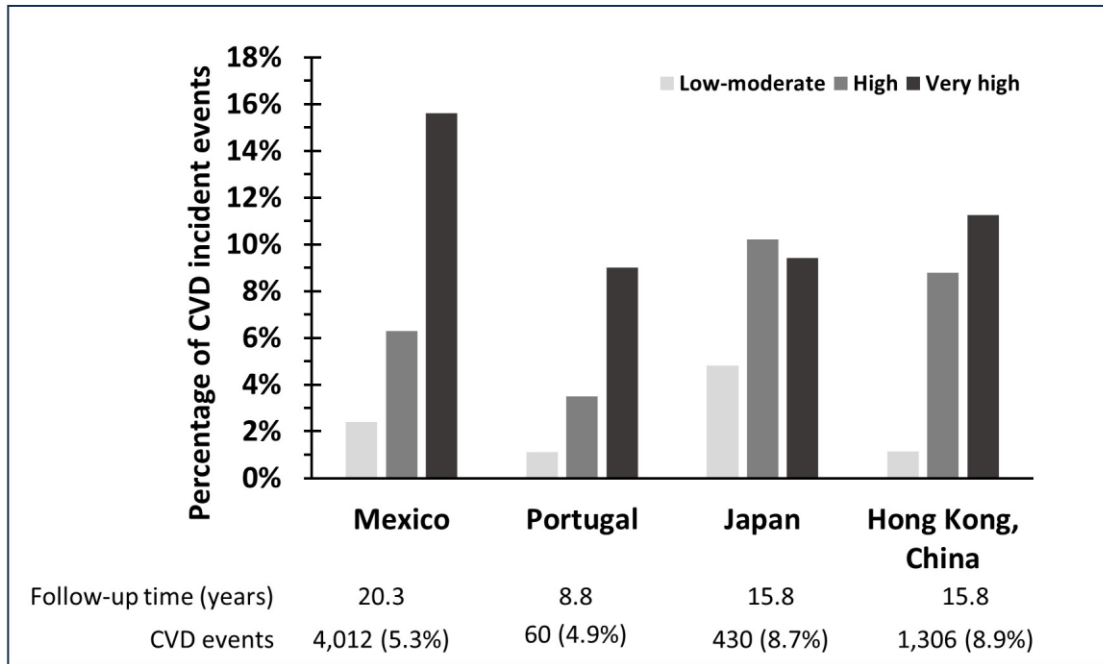
Aim: To evaluate the performance of the SCORE2 in ethnically and socioeconomically diverse populations including outside Europe.

Methods and results: Cohort studies from Mexico, Portugal, Japan, and Hong Kong were included. Differences in risk factors-severity and their combined relevance to 10-years CVD risk in each study-population have been assessed by Harrell's C-statistic, area under the receiver operating characteristic curve (AUROC), Brier score and calibration plots. During 9-18 years of follow-up, a total of 5,808 CVD events were included, 4,012, 60, 430 and 1,306 in Mexico, Portugal, Japan, and Hong Kong respectively. Sensitivities ranged from 83.6 (Mexico) to 98.8 (Hong Kong) and specificities ranged from 10.7 (Hong Kong) to 44.9 (Mexico). In all cases, the positive predictive values were below 10%, while the negative predictive values were all above 95%. The AROC curve was relatively similar between the countries, ranging from 0.714 (Japan) to 0.742 (Mexico). Harrell's C, ranged from 0.552 (Hong Kong) to 0.702 (Mexico), and Brier scores ranged from 0.048 (Mexico) to 0.086 (Japan). In Mexico and Hong Kong, SCORE2 showed good calibration with slight overestimation in higher-risk categories. In Portugal, the overestimation in higher-risk categories was more substantial.

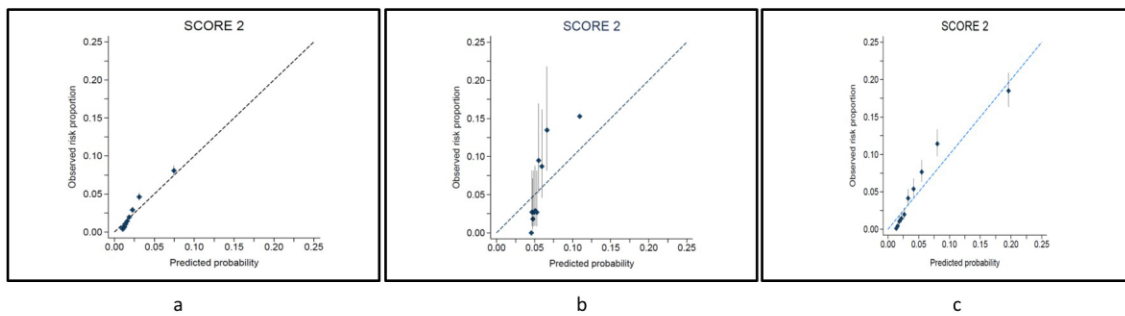
Conclusion: SCORE2 estimates CVD risk relatively well in the Mexican cohort, whereas it performed less well in the other cohorts, indicating the need for recalibration in these populations.

Risk Factors and Prevention, Cardiovascular Risk Assessment, Scores

Distribution of CVD events



Calibration plot



Calibration plot showing the agreement between observed and predicted probability of Mexico (a), Portugal (b), and Hong Kong (c)